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Phase 2 Wildlife Management - Addressing Invasive and Overabundant Wildlife: The White-tailed Deer Continuum and Invasive Wild Pig Example

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ABSTRACT: Wildlife managers in many countries around the world are facing similar challenges, which include: a lack of means to address invasive species and locally overabundant native species issues particularly in the face of declining fiscal resources, reduced capacity to achieve management goals, and a need to garner public support in the wake of changing societal values and increasing human populations. Meeting these challenges requires building off the profession's successes and developing new paradigms and strategies to curtail the negative impacts invasive and overabundant species are having on our natural resources. Like our predecessors in conservation succeeded in developing our profession and initiating a movement that led to the recovery of many valued native species, now it is us who face a comparable albeit somewhat opposite mandate. Our charge is to curtail and reverse the further establishment and impacts of invasive and overabundant species. We must not fail, but with just existing methods and decision processes we cannot succeed. Using wild pigs as an example invasive species and white-tailed deer as a corollary locally overabundant native species, we begin to lay out why we believe we have entered a second herculean phase of our profession that is as crucial to the quality of our future as the initiation of conservation was a century ago.

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THE TALE OF TWO REVERED AND DESPISED UNGULATES

Concurrent with European settlement of North America, white-tailed deer populations began to decline sharply from pressures of market hunting. At the same time domestic swine were introduced, it was the continent's first seeding of invasive wild pig populations which now range over an area that rivals that of deer (see Snow et al. (2017) for current and potential range of wild pigs). In the wake of rapid human expansion several species of native wildlife suffered greatly, some to the point of extinction (e.g., passenger pigeon) and others to extremely low levels (e.g., white-tailed deer, wild turkey, beaver). Theodore Roosevelt and his constituents in conservation instigated what became the field of wildlife management and reversed the trend. The initial focus of the profession was restoring those species so impacted by unregulated market consumption. The deer population line in the figure demonstrates this point (Figure 1). Which brings us to more recent times, where white-tailed deer have become overabundant in many areas,

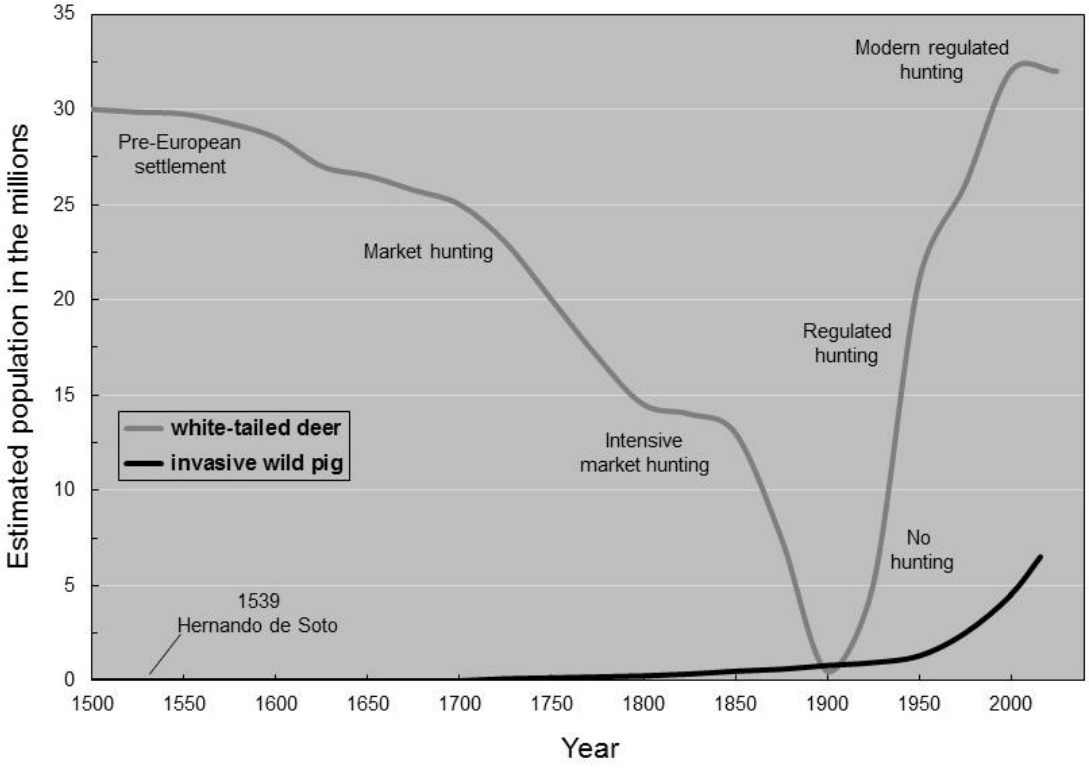

Figure 1. History of white-tailed deer and invasive pig populations in the United States

guilty of causing substantial damage in agricultural and urban settings, and in many cases unable to be managed effectively through recreational hunting as dictated by what has come to be known as the North American Model of Wildlife Conservation (NAMWC; VerCauteren et al. 2011).

Interestingly, when deer populations were at their lowest, just over 100 years ago, invasive wild pig populations had slowly been taking root and were at about that same level. Thus, from a common starting point of about 100,000 individuals, white-tailed deer populations shot to over 30 million where they are stabilizing (VerCauteren 2003) while wild pig populations have lagged but are now increasing more rapidly with current populations exceeding 6 million and predicted to reach over 20 million if not curbed (Lewis et al. in review). These species serve as examples of a common native and common invasive species for which we may need to expand upon, modify or discount aspects of the NAMWC to optimize wise-use and responsible population management (relative to deer see VerCauteren et al. 2011, relative to wild pigs see Bodenchuck and VerCauteren In Press).

Wildlife managers are adept at being flexible, it is a necessity of nudging populations in the desired direction. Our profession has created innovative adaptive management principles and modeling strategies to successfully restore and maintain populations of valued species at goal levels (e.g., Nichols et al. 1995, Berkes et al. 2000, Williams 2011). Associated with some species, like invasive wild pigs and in some cases overabundant white-tailed deer, we have stepped into a second phase of wildlife management where we must purposefully extend upon adaptive management theory to suppress populations.

For wild pigs, where feasible, this means targeting eradication.

How do we do it? By basing our adaptive management strategies off of science-based research results that build upon the foundation we have created as a profession. Just like populations of big game and waterfowl are routinely assessed through a variety of monitoring methods so that management strategies can be tweaked to direct the populations toward management goals, we can apply innovative manipulations of these same principles to achieve goals relative to wild pigs, other invasives, and overabundant natives.

In recent years the wildlife damage management branch of our profession has made great strides in going beyond the data being collected only being reports of the numbers of target animals being removed. In today's world body counts alone are not an acceptable currency. Effort must be put into collecting more data, like that associated with the amount of effort expended to harvest a given number of animals (Davis et al. 2016) or to estimate densities pre- and post-control efforts (Smith 2002). Doing so allows managers to be science-based in evaluating and optimizing their strategies. The next step in contemporary management, then, is to measure the species impacts on resources and economics. By assessing the costs of damage being incurred before and after management actions the relationship among population density, costs of management actions themselves and associated changes in damages incurred can be determined. Though it's not intuitive that diverting limited resources from strictly being used to reduce populations is wise, current research and modeling efforts are demonstrating that because of the knowledge gained from population and damage assessments better decisions can be made for optimizing our ability to best achieve management goals (K. Pepin and A. Davis Unpublished Data). And, importantly, the rationale for management actions are then much more easily justified to all publics and decision makers.

When colleagues ask us if we feel wide-scale eradication of wild pigs is possible we wholeheartedly say "Yes!" Look back at the figure and how deer populations (and those of so many other species) were decimated by lack of knowledge and management, and that was before the advent of semi-auto firearms, helicopters, night-vision and other technological advances. Of course, in today's world we will have unprecedented challenges associated with societal desires, politics, and economics – but we are the next generation of wildlife conservationists, we are up to the task.

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